

WHAT IS CLAIMED IS:

- 1     1.     A fuel cell system comprising:
  - 2                 a fuel cell stack which generates electric energy through an electrochemical reaction between an oxidizer gas containing oxygen as its principal component and a fuel gas containing hydrogen as its principal component;
  - 5                 at least one of first pressure adjusting means for adjusting a pressure of said oxidizer gas to be supplied to said fuel cell stack and second pressure adjusting means for adjusting a pressure of said fuel gas to be supplied to said fuel cell stack;
  - 6                 and
  - 9                 water state diagnosing means for diagnosing a water state of said fuel cell stack,
  - 11                 with a difference between the pressure of said oxidizer gas and the pressure of said fuel gas being controlled in accordance with a result of the diagnosis in said water state diagnosing means.
- 1     2.     The system according to claim 1, wherein, when an internal water in said fuel cell stack is diagnosed as an excessive state, the pressure difference between said fuel gas and said oxidizer gas is controlled so that the pressure of said fuel gas becomes higher than the pressure of said oxidizer gas.
- 1     3.     The system according to claim 1, wherein, when an internal water of said fuel cell stack is diagnosed as shortage, the pressure difference between said oxidizer gas and said fuel gas is controlled so that the pressure of said fuel gas becomes lower than the pressure of the oxidizer gas.
- 1     4.     The system according to claim 1, wherein, if an internal water of said fuel cell stack is diagnosed as appropriateness, the pressure difference between said fuel gas and said oxidizer gas is decreased.

1       5.     The system according to claim 1, further comprising water quantity  
2     adjusting means for controlling a water content of at least one of said oxidizer gas  
3     and said fuel gas so that the water content of at least one of said oxidizer gas and  
4     said fuel gas is decreased when a water permeation to said fuel gas is diagnosed as  
5     excess.

1       6.     The system according to claim 1, further comprising water quantity  
2     adjusting means for controlling a water content of at least one of said oxidizer gas  
3     and said fuel gas so that the water content of at least one of said oxidizer gas and said  
4     fuel gas is increased when the interior of said fuel cell stack is diagnosed as a dry  
5     state.

1       7.     The system according to claim 1, wherein the pressure difference between  
2     said oxidizer gas and said fuel gas is controlled only for a fixed length of time in  
3     accordance with a result of the diagnosis.

1       8.     The system according to claim 1, wherein, when an integrated value of  
2     currents generated from said fuel cell stack exceeds a predetermined value, said  
3     water state diagnosing means makes a diagnosis that water in said fuel cell stack is  
4     in an excessive state.

1       9.     The system according to claim 1, wherein said fuel cell stack includes a lot  
2     of cells and said water state diagnosing means makes a diagnosis on a water state of  
3     said fuel cell stack on the basis of a dispersion state of generated voltages among  
4     said cells.

1       10.    The system according to claim 1, wherein said water state diagnosing means  
2     includes water quantity measuring means provided in at least one of an oxidizer gas

3       outlet/inlet portion of said fuel cell stack and a fuel gas outlet/inlet port thereof for  
4       measuring a water quantity of the gas.

1       11.      The system according to claim 1, wherein said water state diagnosing means  
2       includes resistance measuring means for measuring a resistance of an electrolyte  
3       membrane of said fuel cell stack.

1       12.      The system according to claim 1, further comprising oxidizer gas inlet  
2       pressure measuring means for measuring an inlet pressure of said oxidizer gas in  
3       the interior of said fuel cell stack and fuel gas outlet pressure measuring means for  
4       measuring an outlet pressure of said fuel gas in the interior of said fuel cell stack,  
5       with the pressure of said oxidizer gas and the pressure of said fuel gas being  
6       controlled in accordance with results of the measurement by said oxidizer gas inlet  
7       pressure measuring means and said fuel gas outlet pressure measuring means.

1       13.      The system according to claim 1, further comprising oxidizer gas inlet  
2       pressure measuring means for measuring an inlet pressure of said oxidizer gas in  
3       the interior of said fuel cell stack, oxidizer gas outlet pressure measuring means for  
4       measuring an outlet pressure of said oxidizer gas in the interior of said fuel cell  
5       stack, fuel gas inlet pressure measuring means for measuring an inlet pressure of  
6       said fuel gas in the interior of said fuel cell stack, and fuel gas outlet pressure  
7       measuring means for measuring an outlet pressure of said fuel gas in the interior of  
8       said fuel cell stack, with the pressure of said oxidizer gas and the pressure of said  
9       fuel gas being controlled on the basis of the outlet pressure of one of said oxidizer  
10      gas and said fuel gas which is controlled to be higher than the other and the inlet  
11      pressure of one of said oxidizer gas and said fuel gas which is controlled to be lower  
12      than the other.